Day One, Group C, Energy Problems

Row 1, Extraction Problems

- Produced waters
  - Management/handling
- Groundwater/surface water contamination from coal mining
  - Politics getting worse
  - Near-term problem
  - Cost the problem
- Air emission issues from drift
- Includes municipal cost for treatment downstream
- CBM outfall waters
  - Na levels (impact dependent upon soil type)
  - What to do with water?
  - Problem may be increasing or decreasing over time

Row 2, Fuel Production

- ND clean fuels/oil sands refinery/10-15 thousand bbl/day
  - USACE permit/wetlands concern
  - Sited at water
  - Discharge permit issues
  - Increasing problem over time
- Transportation issues with fuel
  - Unintended consequences/spill shutting down intakes
  - Barge scuttling/security concern
  - Near term issue, staying constant over time
- Plant loop system control
- Irrigation demand for biofuels crops
  - Energy/ag interactions increasing over time
  - Near and long-term problem
- Synfuels
  - Near term being put in strategic planning/studies
  - Input/output water quality concerns first; water quantity second
  - Cyanide issue? Unsure
  - Near-term, need 75 MW pilot plant to prove feasibility

Row 3, Electricity Generation

- Delaware River Water Authority
  - Water availability for power issues within a decade
  - Plant water efficiency issues
  - Increasing over time
  - Conservation (solution)
- Lower efficiency leads to higher demand for water
  - Significant water demand increases if coal comes back
  - Increasing problem over time
- Nukes on Savannah River

    - Competing use conflict (hurdle, not showstopper)
    - Water efficiency of plant designs
- Long-term water impacts
    - Coal-caused water pollution (mercury)
    - Nuclear problems (greater water demands)
    - Thermal pollution concerns

Row 4, Renewables

- Siting for wind
    - Aesthetics
    - Transmission and distribution
    - Bird migration impacts
- Solar thermal
    - Presents water cooling demands
- Geothermal
    - CA-Mammoth; brine as evap cooler medium
- Biomass
    - Emerging problem for transportation
    - Irrigation water/process water
    - Energy crops less thirsty/more resilient
    - Near and long term problem increasing over time
- Low head hydro
    - Same opportunity as big hydro if taken advantage of
    - Purchase power agreements/PURPA
        - Projects stalled and abandoned
    - Permitting—utilities fight loss of load
    - Economies of scale
    - ROI is low
    - Large number of abandoned systems around
- Land use issues
- Conventional hydro
    - Siltation problems
    - Ownership/use of water behind dam
    - Downstream competitive use
        - Need model of interactions
- Hydrogen
    - If NG fired, rolls up all concerns about NG supply/cost
    - Water needs of a hydrogen economy (may be very small compared to other competing uses for water)
    - Potential to produce with solar and wind
    - Distribution network/alternative to electricity T&D/store energy as hydrogen
- ESA
    - Overarching issue that impacts all
- Biogas
    - Water to slurry

        - Regulatory water discharge concern
    - Discharge issues
        - Chemical/bio
        - Reuse (solution)
- Biofuel
    - Chicken manure
- Groundsource geothermal
    - Water neutral

Row 6, Urban Competing Use

- Infrastructure decay
    - GAO reports
    - 20% losses acceptable (up to 40% in some places)
- Water quality
    - Lead/USTs/backflow/purposeful contamination
- Denial of service/natural disasters
    - Lack of planning/funding
        - Mutual Aid/inst. Issues/WURNs?
- Meeting quality standards for use
- Regs increasing energy consumption
    - Impacts everyone
    - Crypto/Stage II Disinfection
- Urban sprawl
    - Increasing energy costs for water distribution/treatment
- Saline intrusion
    - Increasing problem
    - Surface water (saline overflow of rivers)
    - Groundwater in SC (USGS reports)
    - Impact energy intake potential
- Wastewater
    - Effluent discharge issues
        - Boston/Richmond (1987 storm) muni supply issues
- Cost
    - Hull, MA looking at desal
    - Security driving cost
        - NDWAC report
        - Move to inherently safe technologies (more expensive)
- Competing demands
    - Not really an issue/seeing some, but not to extent in West
- Detection capability
    - Real-time/low concentrations
    - Near and long-term problem
        - Lots of work being done

Row 7, Agriculture Competing Use

- Runoff concerns/non-point pollution

    - Downstream impacts
    - Chicken issue (MD, VA, DE)
    - Pigs (NC)
    - Turkeys (NC)
    - Animals are crypto sources
    - Fertilizer/pesticide runoff
- Loss of productive land to sprawl
- Targeted conservation activities, but very localized
- Aquifer contamination
    - Nitrates, salts move through groundwater, making issue areal
    - Bio contaminants not mobile, causing localized problems
- DE, Sussex county groundwater draws
    - Ag impacting Dover AFB
- Energy costs to support irrigation

Rows 8/9, Electricity/Energy Competing Use

- Mercury
    - NE States impacted
    - High concentrations/persistent in environment
    - Need for source removal (hg removal at powerplant before in environment)
    - Fish consumption advisories
    - Central region sourced
    - Solution: scrubbers/fluidized bed
- Contaminant concentration in cooling waters
    - Treatment and disposal problem
    - Cost issue
- Thermal contamination
    - Dispensations to run if necessary
    - Negotiated values per facility (increasing problem over time as regulators push back)
    - Heat from hardscape (summer rain runoff)
    - Science-based at present
- Acid rain/Sox
    - Regional migration of contaminants (national scale problem)
    - ME—habitat impact
- Nutrient runoff/eutrophication (Ag also)
- Some powerplants going to dry cooling
    - Perception of lack of water availability
    - Easier permitting
- Gulf Coast refineries looking at alt. Cooling technologies
- Evap v dry cooling
    - Dry cooling lower efficiencies
    - Env-water tradeoff
    - Using effluent
- Fish kills at intakes

- Disposal/treatment of plant discharge
    - Esp. for zero discharge plants

Row 10, Recreation/Environment Competing Uses

- Water quality impacting recreational use
    - Swimmability
    - Bio standard/no chem. Standard
- Hydrocarbon pollution from boats
- Fish consumption/contamination
- Impacts from hydro
- Aesthetics/viewshed (subjective quantification)
- Geese
- Ocean policy
- Drought-induced competition
- Dam/reservoir access and security
- River limits (3 mile island example)

Overarching

- Lack of analytic framework/tools
    - Need to enhance
    - Subjective and objective issues
    - Modeling
        - Markal example interesting
    - Operation research
    - Need analytical framework
    - Risk assessment/management
        - Security/safety/health/econ/incation
        - Dam/reservoir access and security
- Econ development
    - Regs make it hard to develop
        - Refineries, for example
        - Uneconomic to manufacture in US due to env. Regs.

3151 discovery bay drive 99515